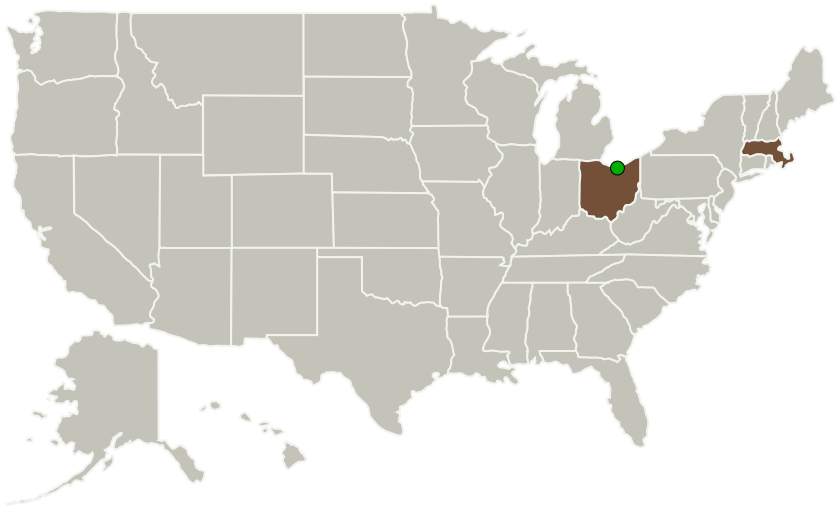
Hall Effect Thruster for High Power Solar Electric Propulsion Technology Demonstration, Phase II

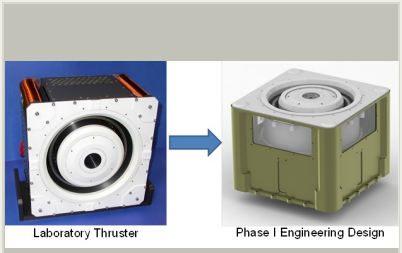
Completed Technology Project (2014 - 2018)

Project Introduction

In Phase I Busek matured the design of an existing 15-kW laboratory thruster. Magnetic modeling was performed to generate a circuit incorporating magnetic shielding. Erosion modeling predicts extremely long lifetime and high throughput. A detailed mechanical design of the thruster resulted in an overall assembly with specific mass <3kg/kW. Modal, dynamic and thermal analyses were performed to calculate resonance frequencies, mode shapes, stress and fatigue values and temperature limits. Experiments using the existing laboratory thruster evaluated a modified anode/gas distributor and a B-field distribution representative of the proposed magnetic shielded configuration. Performance results suggest similar efficiency and performance as the baseline thruster. Visual observation of the plume illustrated the characteristics of magnetic shielding were achieved. In Phase II Busek will complete the detailed design of the thruster and a center mounted hollow cathode. A prototype unit will be fabricated and performance tested included limited duration testing at Busek. Depending on facility availability the thruster will independently tested at GRC. Busek will hold a MRR and CDR then fabricate, assemble, and fully test a qualification model thruster/cathode to raise the maturity to TRL 6. The thruster will be delivered to NASA for extended duration testing to complete the qualification.

Primary U.S. Work Locations and Key Partners





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Organizations Performing Work	Role	Type	Location
Busek Company, Inc.	Lead Organization	Industry Women-Owned Small Business (WOSB)	Natick, Massachusetts
Glenn Research Center(GRC)	Supporting Organization	NASA Center	Cleveland, Ohio

Primary U.S. Work Locations	
Massachusetts	Ohio

Project Transitions

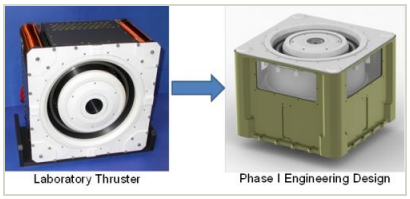
May 2014: Project Start

December 2018: Closed out

Closeout Documentation:

- Final Summary Chart*(https://techport.nasa.gov/file/137712)*

Images



Briefing Chart Image
Hall Effect Thruster for High Power Solar Electric Propulsion Technology Demonstration, Phase II
(https://techport.nasa.gov/image/137168)

Organizational Responsibility

Responsible Mission Directorate:
Space Technology Mission Directorate (STMD)

Lead Organization:
Busek Company, Inc.

Responsible Program:
Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:
Jason L Kessler

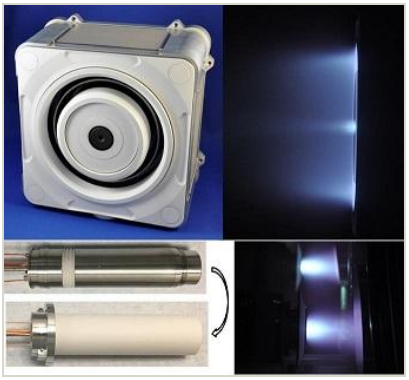
Program Manager:
Carlos Torrez

Principal Investigator:
Vlad Hruby

Co-Investigator:
Vlad Hruby

Hall Effect Thruster for High Power Solar Electric Propulsion Technology Demonstration, Phase II

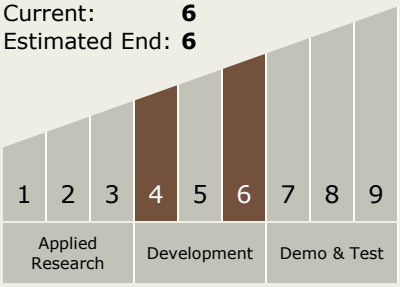
Completed Technology Project (2014 - 2018)



Final Summary Chart Image
Hall Effect Thruster for High Power Solar Electric Propulsion Technology Demonstration, Phase II
(https://techport.nasa.gov/image/130675)

Technology Maturity (TRL)

Start: **4**
Current: **6**
Estimated End: **6**



Technology Areas

Primary:

- TX01 Propulsion Systems
  - TX01.2 Electric Space Propulsion
    - TX01.2.2 Electrostatic

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System